

Example Tolling Agreement Term Sheet Proposal

Term: May 1, 2011, through September 30, 2011.

Capacity: 300 megawatts.

Capacity Payment: Buyer pays seller monthly capacity payments of \$9.20/kW-month (\$2.76 million/month).

Dispatch: Buyer shall have full dispatch rights limited only by the operational constraints of the unit. Maximum available capacity shall be achievable in one hour, assuming that the plant has not been shut down for more than 72 hours.

Minimum Available Capacity
100 MW

Maximum Available Capacity
300 MW

Heat Rate: The referenced heat rate on natural gas shall be 6,400 Btu/kWh. The seller guarantees the referenced heat rate for plant dispatch conditions between minimum and maximum plant output.

Fuel: Natural gas supply and transportation shall be managed by buyer.

Tolling Charge: \$3.75 a megawatt-hour.

Start/Shutdown Costs: Buyer agrees to pay seller \$2,500/start and \$750/shutdown. Unless mutually agreed to by the parties, annual starts shall not exceed 400.

Penalties: Any penalties resulting from a difference in hourly scheduled and delivered megawatt-hours shall be paid from seller to buyer on a monthly basis.

Excess Energy: The buyer will use commercially available efforts to purchase amounts of energy generated in excess of the guaranteed capacity. The buyer will pay the tolling charge for excess energy in receives but will not be required to pay a capacity payment.

Operations: The seller will be responsible for performing operations and maintenance in accordance with generally accepted utility practice.

The tolling agreement specifies the terms and conditions necessary to economically evaluate the opportunity. However, the marketer additionally needs to know the prevailing price of natural gas and electricity, the operating strategy, hedging opportunities and other considerations to fully value the agreement. Both *intrinsic* and *extrinsic* value exists in a tolling agreement. In order to fully manage the risk, the marketer needs to hedge the natural gas supply and forward sell the electric power.

For this example, let us assume that we have an off-take counterparty who is willing to purchase the daily peak power for \$50 a megawatt-hour and a natural gas supplier who is willing to enter into a long-term gas supply contract. What would the natural gas price need to be in order to break even given the terms of this tolling agreement?

To make the problem more interesting, let us assume that the spark spread is such that we expect to operate only on peak weekday hours for the five months May through September. There are 110 peak days in the term of this contract, or an average of 22 peak days per month.

Start and Shutdown Costs

- There are 22 starts: $22 * \$2,500 = \$55,000/\text{month}$
- The unit is shut down 22 times: $22 * \$750 = \$16,500/\text{month}$

Capacity Payment

- The monthly capacity payment is \$2.76 million ($300 \text{ MW} * \$9.20/\text{kW-month}$)

Tolling Charge

- \$3.75 a megawatt-hour
- 22 peak days per month * 16 peak hours = 352 peak hours per month
- Average PPA revenue potential = $\$3.75/\text{MWh} * 352 \text{ h} * 300 \text{ MW} = \$396,000/\text{month}$

Revenue Potential From the Power-Purchase Agreement

- \$50 a megawatt-hour for peak weekday hours
- 22 peak days per month * 16 peak hours = 352 peak hours per month
- Average PPA revenue potential = $\$50/\text{MWh} * 352 \text{ h} * 300 \text{ MW} = \$5,280,000/\text{month}$

Maximum Natural Gas Quantity

- 6,400 Btu/kWh heat rate = 6.4 MMBtu a megawatt-hour
- Total monthly natural gas = $6.4 \text{ MMBtu a megawatt-hour} * 352 \text{ h} * 300 \text{ MW} = 675,840 \text{ MMBtu's}$

The Breakeven Price of Natural Gas

The expected net revenue from this tolling agreement including the \$50 a megawatt-hour revenue potential from the off-take power-purchase agreement is:

$$\text{PPA Revenue} - \text{Capacity Pmt} - \text{Tolling Pmt} - \text{Start Cost} - \text{Shutdown Cost} = \text{Net Revenue}$$
$$\$5,280,000 - \$2,760,000 - \$396,000 - \$55,000 - \$16,500 = \$2,052,500$$

The marginal operating costs are included in the economic heat rate; thus, for the spark spread to remain positive, the total monthly payment for natural gas (including delivery) cannot exceed the power revenue.

- Total natural gas payment = \$2,052,500
- The breakeven cost of gas = $\$2,052,500/675,840 \text{ MMBtu} = \$3.04 \text{ a million Btu's}$